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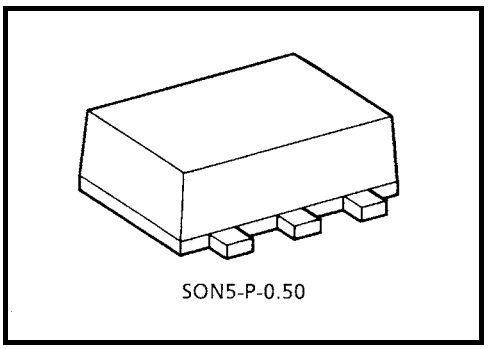
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7SH14FE

SCHMITT INVERTER

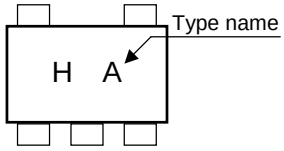
Features

- Super high speed operation : t_{PD} = 5.5 ns (typ.) @V_{CC} = 5 V
- Low power dissipation : I_{CC} = 2 μA (Max.) @ Ta = 25°C
- 5.5V tolerant input.
- Wide operation voltage range : V_{CC} (opr) = 2~5.5 V

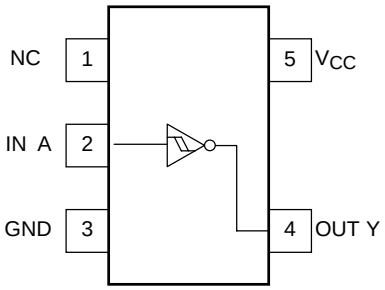


Weight: 0.003 g (typ.)

Marking



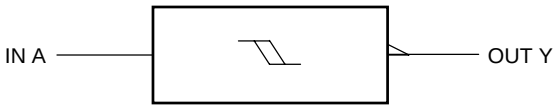
Pin Assignment (top view)



Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	−0.5~7	V
DC input voltage	V_{IN}	−0.5~7	V
DC output voltage	V_{OUT}	−0.5~V_{CC} + 0.5	V
Input diode current	I_{IK}	−20	mA
Output diode current	I_{OK}	±20	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC}/ground current	I_{CC}	±50	mA
Power dissipation	P_D	150	mW
Storage temperature	T_{stg}	−65~150	°C

Logic Diagram



Truth Table

A	Y
L	H
H	L

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2~5.5	V
Input voltage	V_{IN}	0~5.5	V
Output voltage	V_{OUT}	0~ V_{CC}	V
Operating temperature	T_{opr}	−40~85	°C
Input rise and fall time	dt/dv	0~100 (V_{CC} = 3.3 V ± 0.3 V)	ns/V
		0~20 (V_{CC} = 5 V ± 0.5 V)	

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		Ta = 25°C				Ta = −40~85°C		Unit
				V_{CC} (V)	Min	Typ.	Max	Min	Max	
Positive Threshold Voltage	V_P	—		3.0	—	—	2.20	—	2.20	V
				4.5	—	—	3.15	—	3.15	
				5.5	—	—	3.85	—	3.85	
Negative Threshold Voltage	V_N	—		3.0	0.90	—	—	0.90	—	V
				4.5	1.35	—	—	1.35	—	
				5.5	1.65	—	—	1.65	—	
Hysteresis Voltage	V_H	—		3.0	0.30		1.20	0.30	1.20	V
				4.5	0.40		1.40	0.40	1.40	
				5.5	0.50		1.60	0.50	1.60	
High-level output voltage	V_{OH}	V_{IN} = V_{IL}	I_{OH} = −50 μA	2.0	1.9	2.0	—	1.9	—	V
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			I_{OH} = −4 mA	3.0	2.58	—	—	2.48	—	
			I_{OH} = −8 mA	4.5	3.94	—	—	3.80	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH}	I_{OL} = 50 μA	2.0	—	0	0.1	—	0.1	V
				3.0	—	0	0.1	—	0.1	
				4.5	—	0	0.1	—	0.1	
			I_{OL} = 4 mA	3.0	—	—	0.36	—	0.44	
			I_{OL} = 8 mA	4.5	—	—	0.36	—	0.44	
Input leakage current	I_{IN}	V_{IN} = 5.5 V or GND		0~5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	2.0	—	20.0	μA

AC Characteristics (input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = −40~85°C		Unit
		V_{CC} (V)	C_L (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	t_{PLH} t_{PHL}	3.3 ± 0.3	15	—	8.3	12.8	1.0	15.0	ns
			50	—	10.8	16.3	1.0	18.5	
		5.0 ± 0.5	15	—	5.5	8.6	1.0	10.0	
			50	—	7.0	10.6	1.0	12.0	
Input capacitance	C_{IN}			—	4	10	—	10	pF
Power dissipation capacitance	C_{PD}	(Note)		—	14	—	—	—	pF

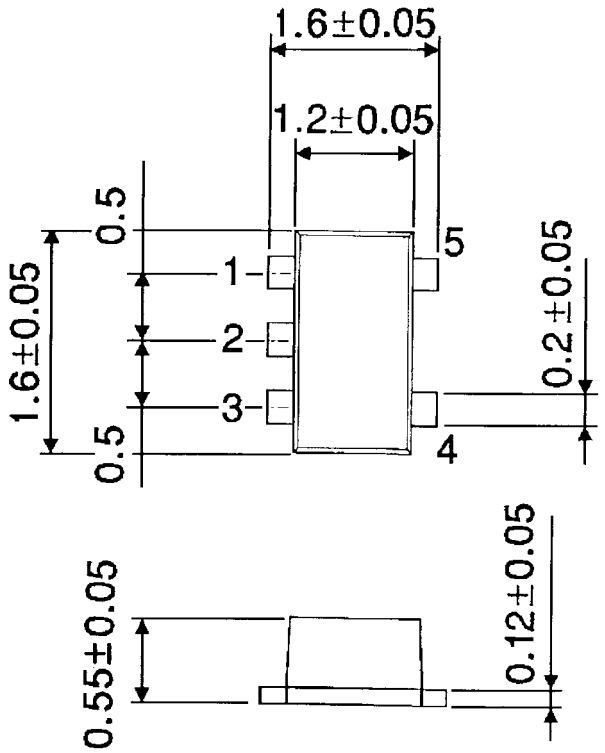
Note: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation.

$$I_{CC\ (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Package Dimensions

SON5-P-0.50 Unit : mm



Weight: 0.003 g (typ.)

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